

ABSTRACT

An electrospray device, a liquid chromatography device and an electrospray-
liquid chromatography system are disclosed. The electrospray device comprises a
substrate defining a channel between an entrance orifice on an injection surface and
an exit orifice on an ejection surface, a nozzle defined by a portion recessed from the
ejection surface surrounding the exit orifice, and an electrode for application of an
electric potential to the substrate to optimize and generate an electrospray; and,
optionally, additional electrode(s) to further modify the electrospray. The liquid
chromatography device comprises a separation substrate defining an introduction
channel between an entrance orifice and a reservoir and a separation channel between
the reservoir and an exit orifice, the separation channel being populated with
separation posts perpendicular to the fluid flow; a cover substrate bonded to the
separation substrate to enclose the reservoir and the separation channel adjacent the
cover substrate; and, optionally, electrode(s) for application of a electric potential to
the fluid. The exit orifice of the liquid chromatography device may be
homogeneously interfaced with the entrance orifice of the electrospray device to form
an integrated single system. An array of multiple systems may be fabricated in a
single monolithic chip for rapid sequential fluid processing and generation of
electrospray for subsequent analysis, such as by positioning the exit orifices of the
electrospray devices near the sampling orifice of a mass spectrometer.